Satellite Broadcasting and Communications Association of America

January 23, 1989

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Federal Communications Commission
Office of the Secretary

HAND DELIVERY

Mr. H. Walter Feaster, III
Acting Secretary
Office of the Secretary
Federal Communications Commissions
Washington, D.C. 20554

Dear Mr. Feaster:

Enclosed please find one original and nine copies of the Reply Comments of the Satellite Broadcasting and Communications Association on MM Docket 87-268 (pursuant to the Tentative Decision and Notice of Further Inquiry).

Should you have any questions, please feel free to contact me.

Sincerely,

Mark C. Ellison
Vice President
Government Affairs
and General Counsel

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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the matter of Advanced Television Systems and Their Impact on the Existing Television Broadcast Service Review of Technical and Operational Requirements Part 73-E, Television Broadcast Stations Reevaluation of the UHF Television Channel and Distance Separation Requirements of Part 73 of the Commission's Rules	MM Docket No. 87-268 FCC 88-288

REPLY COMMENTS OF THE SATELLITE BROADCASTING AND COMMUNICATIONS ASSOCIATION (SBCA)

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Before the
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and Their Impact on the Existing	)	
Television Broadcast Service	)	
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Part 73-E, Television Broadcast	)	FCC 88-288
Stations	)	
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Reevaluation of the UHF Television	)	
Channel and Distance Separation	)	
Requirements of Part 73 of the	)	
Commission's Rules	)	

REPLY COMMENTS OF THE SATELLITE BROADCASTING AND COMMUNICATIONS ASSOCIATION (SBCA)

Introduction

The Satellite Broadcasting and Communications Association of America, by its undersigned attorney, herewith submits its Reply Comments pursuant to the Tentative Decision and Further Notice of Inquiry, FCC 88-288, released September 1, 1988 ("Tentative Decision"). These Reply Comments respond to comments filed in response to the Tentative Decision as they pertain to spectrum requirements, emission standards, and receiver standards for advanced television service.

Spectrum Requirements

Consistent with the SBCA's previous filings in this proceeding, it is submitted that the Commission's decision to allot supplemental spectrum for terrestrial broadcasting of advanced television service (ATV) only within the existing VHF and UHF television allocations is technically and economically sound. Such decision should be made final. The Comments of the Electronics Industries Association ATV Committee (EIA) support the SBCA's position in this regard. EIA states that it agrees with the Commission's conclusion that the ATV system will only use VHF and UHF bands and notes, correctly, that, "to plan on expanding would lengthen the time required to make new spectrum space available for ATV. Further, it is not clear that these other bands under consideration are technically appropriate for ATV."

Other commenters, including the National Association of Broadcasters (NAB) and the Association of Maximum Service Telecasters (AMST), while objecting to a final decision limiting spectrum to existing VHF and UHF, do not dispute the desirability of such a limitation as an objective. Nor do they reject the feasibility of such a limitation using one or more of the proponent formats being studied by the FCC Advisory Committee. Rather, their objection to the Tentative Decision in this regard is based upon their contention that the Commission should defer a final decision until the predicted performance of those formats has been confirmed in laboratory and field tests.

The SBCA does not believe that such a decision deferral is needed. We are persuaded by the performance predictions and theoretical analyses of how VHF/UHF spectrum can be assigned to permit all present terrestrial stations to offer ATV services. Further, insofar as the 12.2 - 12.7 GHz DBS allocation is concerned, there is little room for doubt that terrestrial broadcasting within that spectrum is not feasible. Clearly, sufficient data exists without need for further testing to confirm this fact. (A detailed basis for such conclusion is contained in the letter of Richard G. Gould to Robert A. O'Connor, Chairman of Specialist Group 4 within Working Party 3 of the Planning Subcommittee, FCC ATS Committee, which is attached hereto as Appendix 1.)

More fundamentally, the SBCA recognizes that in addition to all of the valid technical reasons cited by the Commission for its tentative decision, important business and economic reasons compel this decision and mandate its finalization. As stated in our earlier filings, the advent of high powered direct broadcast satellite service is imminent. However, our industry cannot move forward and attract financial support if the continued availability of the spectrum allocated to and internationally planned for the DBS service remains at issue.

Emission Standards and Receiver Standards

In its comments, the SBCA supported the Commission's tentative decision to limit mandatory standards-setting to the terrestrial broadcasting service. The SBCA supported the position that satellite transmission of video should not be constrained to use the same format as terrestrial

broadcasting. The SBCA argued that, in all likelihood, ATV receive systems will be designed in a manner which will permit the reception of baseband video signals and the display of ATV signals that are transmitted in a variety of formats.

There was wide ranging support for the position that the FCC should not adopt mandatory emission format standards for media other than terrestrial broadcasting. There was disagreement, however, on whether there was a need for the FCC to adopt mandatory receiver standards. Following is synopsis of the comments on these issues.

GTE Corp. argued that a single ATV standard for all transmission media would be a straitjacket that would deny the public more advance technology. National Cable Television Association said that the possibility of multiple standards for different transmission formats should not be foreclosed. Time Inc. said that allowing each medium to provide ATV in a manner that is optimum for that medium will benefit consumers, and that cost effective receiver interfaces will develop without regulation. General Instrument Corporation argued that cable TV and satellite broadcasters should not be constrained to use the same ATV format as terrestrial broadcasters because the public should be allowed to benefit from the enhanced picture quality that might result from availability of additional spectrum on cable and satellite systems.

AMST said that the FCC should encourage compatibility with alternative media, for example, by requiring all ATV receivers to be equipped with component video inputs. Hughes Communications Inc. agreed that the FCC

should promote interoperability of ATV on alternative transmission media by adopting guidelines for a display standard. Similarly, Group W Broadcasting said that the FCC should consider requiring TV receivers to have a baseband input port. Sarnoff Research Center supported a receiver interface standard at the RGB or YIQ level.

The telephone companies agreed that the FCC should not require that a single transmission standard be used by all transmission media, but that the Commission should adopt a mandatory receiver interface standard. See Comments of Pacific Bell; Bell Atlantic Telephone Companies; Bell South Corp.; Ameritech Operating Companies; Mountains States, Northwestern Bell and Pacific Northwest Bell Telephone Companies; Southwestern Bell Telephone Co.

EIA stated that the FCC lacks authority to adopt a mandatory standard for non-spectrum using media, but argued that other media must select transmission formats having baseband video and sound parameters that are common to the broadcast format, so that a single receiver can be used for display. Thomson Consumer Electronics agreed and said that all formats chosen by alternate media should be raster format compatible, with the same number of horizontal and vertical lines and the same time interval. The EIA ATV Committee opposed the FCC adoption of mandatory receiver standards.

NAB said that the FCC should actively encourage compatibility between broadcast and non-broadcast ATV formats. CBS, Inc. said that non-broadcast media should adopt formats that are conveniently

interoperable with broadcast ATV, but that interoperability may be achieved in different ways and to different degrees, and deserved further study. Sony Corp. agreed that interoperability between alternate media ATV is desirable, but more R&D is needed to understand the degree of interoperability that can be achieved.

Professor William F. Schreiber was one of the few who disagreed; he argued that allowing alternative media to adopt different ATV formats could lead to the marketing of mutually incompatible receivers.

In light of this overwhelming support, it is clear that the Commission should not adopt mandatory ATV formats for transmission media other than terrestrial broadcasting. While the question of the need for mandatory receiver interfaces may deserve further analysis, it is our belief that TV receiver manufacturers will voluntarily develop ATV receivers that can be sold to and used by all U.S. consumers, regardless of whether they receive programming from broadcasting, cable TV or satellite. We further believe that satellite video distributors will adopt formats that are sufficiently compatible with the terrestrial broadcasters format so that consumers can use a common display system.

Conclusion

The SBCA urges the Commission to make final the Tentative Decision in so far as it (1) requires that terrestrial transmission of ATV be confined

to existing UHF/VHF spectrum and (2) limits mandatory standard-setting for ATV delivery to the terrestrial broadcasting service.

Respectfully submitted,

Satellite Broadcasting & Communications Association of America

By: _____

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E.E. Reinhart
Chairman
SBCA Technical Committee

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Jeffrey A. Krauss, Ph.D.
SBCA Technical Committee

APPENDIX 1

TELECOMMUNICATIONS SYSTEMS

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Telecopier (Manual Receive) • 223-4450

January 10, 1989

Mr. Robert A O'Connor, Chairman PS/WP-3
Planning Subcommittee, FCC/ATS Committee
37 Ridgeview Circle
Princeton, NJ 08540

Dear Bob:

1. Introduction

This letter comments on the 12 GHz propagation tests to be conducted by the ATTC with the goal of making "a valuable contribution to the available information on the subject."

The tests are referenced in the Draft Second Preliminary Report, of Specialist Group 4, PS/WP-3, dated 30 December 1988. That report first notes that:

> the FCC has outlined the technical problems associated with microwave frequencies, such as shadowing from trees and foliage, obstruction by buildings and attenuation caused by heavy rain.

The report then goes on to state the opinion of the Specialist Group that:

> The magnitude of the technical problems just described, involving wide-band television signals has not been fully explored and the additional data to be provided by the ATTC would be a valuable contribution to the available information on the subject.

This letter first summarizes what <u>is</u> known about propagation at 12 GHz, and the implications of those findings on the feasibility of using this part of the spectrum for terrestrial broadcasting. This letter then describes what I believe to be serious shortcomings in the ATTC tests as currently planned which would prevent any new valid conclusions from being drawn on the feasibility of such use. However, it is my opinion that if those shortcomings are corrected, the test results will only show that the effects of propagation on terrestrial broadcasting at 12 GHz would be <u>worse</u> than past tests have shown.

2. Current Knowledge of 12 GHz Propagation Factors and Their Likely Effect on Terrestrial Broadcasting

CCIR report 562-3 describes the propagation effects that would affect sound and television broadcasting above 10 GHz. Although these data are qualified as "very preliminary," the data to date

are quite discouraging. The report summarizes measurements in the Federal Republic of Germany, France, Japan, Switzerland and the United States.

Referring to the measurements made by CBS in 1982 in San Francisco, the report states:

> Measurements of broadcast transmissions at 12 GHz in the United States of America [Bentz, 1982] demonstrated the importance of line-of-sight paths for service in this band. In a hilly urban area in San Francisco, where 38% of the paths were obstructed by terrain or buildings, the obstructed paths had a median attenuation 20 dB greater than the line-of-sight paths.

The CBS tests were conducted for a short period of time when there was little or no rain, that is, for the most part these are clear-sky measurements. Even under such benign conditions a 20 dB power margin would have to be provided to overcome attenuation at half of those obstructed locations and to thereby bring the percentage of "unobstructed" paths to 81%.

Measurements would have to be made, in the San Francisco area, for a much longer period of time -- perhaps years -- to assess the consequences of precipitation and other adverse propagation phenomena in the San Francisco area. Similar tests would be necessary to assess the adverse effects of propagation in diferent climatic regions.

Note that the FCC definition of Grade A service is that the median field strength must provide a picture which is "acceptable" to the median observer for at least 90% of the time at the best 70% of locations. At UHF and VHF experience indicates that even if only 70% of locations receive the field strength of Grade A service, it is still possible to obtain a usable picture at essentially every location in the area with a reasonable outdoor antenna installation. However, at 12 GHz, with Grade A service at only 70% of locations, a substantial number of locations would not be able to receive any service at all. The San Francisco tests showed that 38% of locations were obstructed and that the median attenuation at those locations was 20 dB, and the German tests described in Report 652-3 also showed large attenuations due to blockage: The difference between field strength from the Schaefferberg transmitter site for 50% and 90% of receiving locations was about 40 dB.

In the Japanese tests, one fixed 200 watt transmitter fed an omnidirectional biconical antenna. Coverage area was on the order of a few kilometers. Observations made at 3 km from the transmitter indicated that with receiving antennas at the FCC standard height of 30 feet, only 80% of locations would be provided service.

The German tests show that the distance to the 70 dBu contour from four different transmitting locations in the Berlin area

having antenna heights of 200, 95, 84 and 56 meters were, respectively, 1 km, 4.8 km, 5.8 km, and less than 1 km. These results are based on the following conditions and assumptions: service to 90% of the locations within the contour, and for only 90% of the time (the so-called "City Grade Service"), e.i.r.p.=32 dBW, S/N=45 dB, Receiver NF=4 dB, G_r=35.5 dB (diam=0.6 m), and fade margin=4 dB. Calculations indicate that if the antenna heights were increased to 300 meters (about 1000 feet) the distances would be increased to 1.5 km, 15.4 km, 21 km and less than 5.4 km, respectively. In view of the power limitations and high loss of waveguide or coaxial transmission lines, the transmitter would require problematic installation and maintainance at the top of the tower. An e.i.r.p. of 32 dBW would require a 50 watt transmitter if the antenna had 15 dB gain.

Other observations in the German tests include the following:

> Single trees in the direct path caused attenuations up to...10 dB, rapidly fluctuating during wind and strongly varying with season in the case of deciduous trees. In comparison with UHF, measured attenuations at 12 GHz in the deep shadow regions were larger by about 10 to 20 dB. (Section 3.1)

The report also notes that:

> The propagation characteristics in this frequency band are such that the effective coverage range of each transmitter will be small and, hence, to achieve the necessary coverage probability, high transmitter densities may be required. Estimation of the minimum separation distance between co-channel transmitters is therefore of particular importance. This estimation should not be based solely on a calculation of long-term median values of transmission loss, but consideration should also be given to abnormal conditions causing important [interfering] signal enhancement over long distances for small percentages of the time. (Section 2.2)
>
> If atmospheric conditions are such that ducting is possible at the transmission frequency, then the interference field strength may be considerably increased, depending on whether the station antenna is located within the duct. (Section 2.2)
>
> For network planning at 12 GHz, [interference] ranges below about 300 km (!) are of particular interest. Measurements in...Germany...showed that the reduction in field strength with increasing distance was <u>less</u> than that predicted [by NBS Tech. Note 101]. (Section 3.2, emphasis added)

Still other technical aspects which limit the feasibility of the 12 GHz band for terrestrial broadcasting are discussed by Stiel-

per ("Feasibility of Terrestrial Broadcasting in the 12 GHz Band," J. W. Stielper, A. D. Ring & Associates, Washington, D.C. December 23, 1981), and in a previous communication of mine which I have included here as Attachment 1 for your convenient reference.

3. Proposed ATTC/ATSC Propagation Tests

Will the tests designed by ATSC and to be carried out by the ATTC add to our understanding of the suitability or feasibility of the 12 GHz band for terrestrial broadcasting in general, and for advanced television systems specifically? What conclusions will the Advisory Committee be able to draw from these tests and, therefore, what recommendations will it be able to make to the FCC?

The proposed tests are summarized in an "Attachment A" to the Draft Second Preliminary Report of PS/WP-3, Specialist Group 4, dated December 30, 1988. Since that report states that the attachment will not be available until the January 11 meeting of WP-3, I am basing my comments on the "Test Plan for HDTV Propagation," Revision B, March 28, 1988, which was developed by T3S4, the Specialist Group on HDTV Transmission of the ATSC and which was later incorporated in the report of PS/WP-2, the Working Party on ATV Testing and Evaluation Specifications, and subsequently communicated to the ATTC by SS/WP-2, the Working Party on ATS Evaluation and Testing.

The comments which follow are relevant to the tests contained in Attachment A, to the extent that those proposed ATTC tests are similar to those in the ATSC & ATV/PS/WP-2 Test Plan.

Regarding the 12 GHz band, the Test Plan states in Sections 10.6 and 11.2, that: "Tests will be made from a fixed site for a two-week period." And "Following tests at the fixed site, receiving and test equipment will be installed in the van for field tests. Measurements will be made at the grid points using the computer program described in Figure 19." No indication is given of the period of time over which these "field test" measurements will be taken at each of the grid points, but it would appear that they will be taken over a shorter period than the two-weeks of the fixed site tests -- perhaps even as short a period as one day. (The Draft Second Preliminary Report does refer in Section 4.0, to two test periods, one without foliage present in early February, and the other with foliage present in the Spring-Summer. No duration is specified for either period.)

If so, then the ATS Committee will not be able to draw any valid conclusions on the suitability of the 12 GHz band for terrestrial broadcasting of advanced television systems, from the standpoint of propagation.

The need for synoptic measurements taken over long periods of time, and the assessment of 12 GHz propagation as a function of local climatic conditions is widely recognized:

A 12 to 18 month investigation and test period should be initiated for broadcasters to conduct extensive 12 GHz terrestrial propagation tests. (Comments of CBS Inc. in Support of Petitions for Notice of Inquiry and Petition for Special Relief, February 24, 1987); and

The necessary tests and evaluations in the 12 GHz band need to be conducted in different sections of the country, in different terrains, climatic conditions and population densities. Also, it is necessary to establish whether AM or FM is preferable for over-the-air HDTV broadcasting. (ibid. page 13)

[R]eceived field strengths are subject to several natural and man-made phenomena...which can cause the field strengths to vary over periods of time and from one location to another. These changes can be long term such as seasonal changes, i.e. weather, temperature, and foliage, or short term changes such as weather disturbances, i.e. storms and fronts, and vehicles passing in front of the receiver. These variations have an effect on radio systems that is difficult to account for when determining service areas. Thus, it is appropriate to describe field strengths by statistical means: the percentage of locations that will receive a particular field strength for some percentage of time. However, the general terrain in the area must still be considered. (Engineering Handbook, 7th Ed., E.B. Crutchfield, Editor, NAB, Washington, D.C., Chapter 9: Radio Wave Propagation, page 2.9-249.)

4. Conclusions

Theory and measurements to date indicate that the 12 GHz band is unsuitable for a nationwide network of terrestrial broadcasting stations.

Use of the band for wideband ATV or HDTV television broadcasting is even more problematic, difficult, or impracticable.

Measurements which are not made over long periods of time, under propagation conditions to be experienced during actual operation, and in the different climatic areas typical of the United States will not add appreciably to our present knowledge of this band and will not resolve any remaining questions of the suitability of this band for terrestrial broadcasting.

Sincerely yours,

Richard G. Gould